U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

Scientific Name:

Penstemon scariosus var. albifluvis

Common Name:

White River beardtongue

Lead region:

Region 6 (Mountain-Prairie Region)

Information current as of:

03/29/2012

Status/Action

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

_X_ Continuing Candidate

___ Candidate Removal

> ___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status
>
> ___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species
>
> ___ Range is no longer a U.S. territory
>
> ___ Insufficient information exists on biological vulnerability and threats to support listing
>
> ___ Taxon mistakenly included in past notice of review
>
> ___ Taxon does not meet the definition of "species"
>
> ___ Taxon believed to be extinct
>
> ___ Conservation efforts have removed or reduced threats

___ More abundant than believed, diminished threats, or threats eliminated.

Petition Information

___ Non-Petitioned

_X_ Petitioned - Date petition received: 05/11/2004

90-Day Positive:05/11/2005

12 Month Positive:10/26/2011

Did the Petition request a reclassification? **No**

For Petitioned Candidate species:

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing? **Yes**

Explanation of why precluded:

Higher priority listing actions, including court approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for this species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The Progress on Revising the Lists section of the current CNOR (http://endangered.fws.gov/) provides information on listing actions taken during the last 12 months.

Historical States/Territories/Countries of Occurrence:

- **States/US Territories**: Colorado, Utah
- **US Counties**: Rio Blanco, CO, Uintah, UT
- **Countries**:Country information not available

Current States/Counties/Territories/Countries of Occurrence:

- **States/US Territories**: Colorado, Utah
- **US Counties**: Rio Blanco, CO, Uintah, UT
- **Countries**:Country information not available

Land Ownership:

Land ownership for *Penstemon scariosus* var. *albifluvis* habitat is a mosaic of Federal, state, and private lands. Approximately 71 percent of the species' population (by count) occurs on public lands managed by the Bureau of Land Management (BLM). The remaining 29 percent occurs on the State of Utah and private lands (Utah Natural Heritage Program (UNHP) 2011, entire; Fitts and Fitts 2009, entire; Fitts 2010, entire).

Lead Region Contact:

OFC OF THE RGNL DIR, Sarah Fierce, 303 236-4388, Sarah_Fierce@fws.gov

Lead Field Office Contact:

UT ESFO, Jessi Brunson, 801 975-3330, Jessi_Brunson@fws.gov

Biological Information

Species Description:

Penstemon scariosus var. *albifluvis* (White River beardtongue) is a shrubby, perennial plant with showy lavender flowers. It grows up to 50 centimeters (cm) (20 inches (in.)) tall, with multiple clusters of upright stems. It has long, narrow, green leaves. Like other members of the *Penstemon* genus, *P. s.* var. *albifluvis* flower petals are fused into a characteristic, two-parted flower with an upper and lower lip and a distinct sterile stamen (male floral part, or "staminode") that is 9-10 mm (0.35-0.39 in.) long. The dry, multi-parted fruit is 8-11 mm (0.31-0.43 in.) long and contains 10 to 20 seeds (England 1982, p. 367). Blooming occurs from May into early June, with seeds produced by late June (Lewinsohn 2005, p. 9).

Taxonomy:

White River penstemon was described as a new species, *Penstemon albifluvis*, in 1982 (England 1982, entire). In 1984, the taxon was described as variety *Penstemon scariosus* var. *albifluvis* (Cronquist *et al.* 1984, p. 442). *P. s*. var *albifluvis* has a shorter corolla and shorter anther hairs than typical *P. scariosus*. The basal leaf rosette in *P. s.* var. *albifluvis* is reduced and deciduous early in the growing season. In addition, the habitat of the two varieties is different and disjunct. *P. s.* var. *albifluvis* is endemic to low elevation oil shale barrens near the White River along the Utah-Colorado border, and typical *P. scariosus* habitat occurs at higher elevations on the West Tavaputs and Wasatch Plateaus of central Utah (Cronquist *et al.* 1984, p. 442).

Habitat/Life History:

Penstemon scariosus var. *albifluvis* is restricted to calcareous (containing calcium carbonate) soils derived from oil shale barrens of the Green River Formation in the Uinta Basin of northeastern Utah and adjacent Colorado. The habitat of *P. s.* var. *albifluvis* a series of knolls and slopes of raw oil shale derived from the Green River geologic formation (Franklin 1995, p. 5). These soils are often white or infrequently red, fine-textured, shallow, and usually mixed with fragmented shale. These very dry substrates occur in lower elevations of the Uinta Basin; between 1,500 and 2,040 meters (m) (5,000 and 6,680 feet (ft)). *P. s.* var. *albifluvis* is found in semi-barren areas associated with shadscale (*Atriplex confertifolia*), rabbitbrush (*Chrysothamnus viscidiflorus*), rice grass (*Stipa hymenoides*), Salina ryegrass (*Elymus salinus*), Barneby's thistle (*Cirsium barnebyi*), ephedra wild buckwheat (*Eriogonum ephedroides*), piñon pine (*Pinus edulis*), and juniper (*Juniperus osteosperma*) (Neese and Smith 1982, p. 58; Goodrich and Neese 1986, p. 283).

This species is probably relatively long-lived due to the presence of a substantial and multi-branched woody stem (Lewinsohn *et al*. 2005, p. 3). Most plants begin to flower when the woody stem reaches 3 to 4 cm (1 to 1.5 in.) (Lewinsohn 2005, p. 4). The species is pollinated by a wasp, *Pseudomasaris* vespoides, and several bee species in the genera *Osmia*, *Ceratina*, *Anthophora*, *Lasioglossum*, *Dialictus*, and *Halictus* (Sibul and Yates 2006, p. 14; Lewinsohn and Tepedino 2007, p. 235).

Historical Range/Distribution:

The historic range of *Penstemon scariosus* var. *albifluvis* has not changed since the species was first described in 1982 (England 1982, pp. 367-368). *P. s.* var. *albifluvis* was first discovered along the north bank of the White River one mile upstream from the Ignacio Bridge (England 1982, p. 367). The historic range

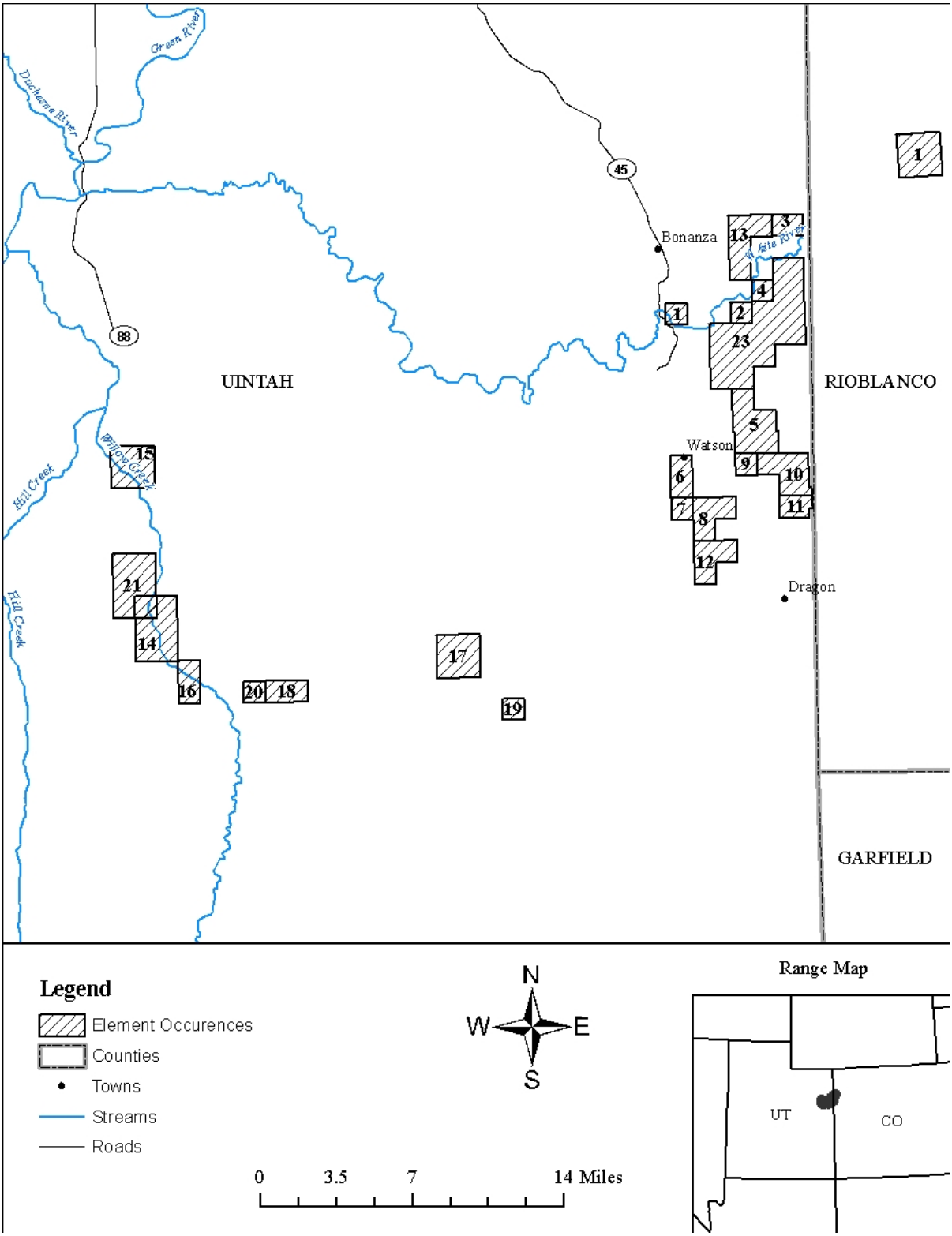
was described as occurring from east central Uintah County, Utah, to Rio Blanco County, Colorado (England 1982, p. 367).

Current Range Distribution:

Penstemon scariosus var. *albifluvis'* range extends from Raven Ridge west of Rangely in Rio Blanco County, Colorado, to the vicinity of Willow Creek in Uintah County, Utah. The bulk of the species' range occurs between Raven Ridge and Evacuation Creek in eastern Utah, a distance of about 20 miles (30 kilometers) (Figure 1) (Franklin 1995, p. 2; Fitts and Fitts 2008, 2009, entire; Fitts 2010, entire; Colorado Natural Heritage Program 2010a, entire; Utah Natural Heritage Program 2011, entire). Although previous maps for this species (see Neese and Smith 1982, p. 59; Franklin 2005, pp. 154–155) show the westernmost limit of *P. s.* var. *albifluvis* at Evacuation Creek, herbarium collections from 1977 to 1998 extend this range further west to Willow Creek, Buck Canyon, and Kings Well Road (Figure 1, element occurrence numbers 16–21). Element occurrences (hereafter "occurrences") are plant locations that are grouped together based on geographic proximity and—in the absence of better information about a species' biology and distribution—roughly represent populations. These herbarium collection locations have not been revisited to confirm the species' presence or to estimate population sizes.

Penstemon scariosus var. *albifluvis'* potential habitat extends over 64,000 acres (259 square kilometers (sq. km)) (100 sq. miles (mi)), based on surface exposures of Green River Formation oil shale barrens in Colorado and Utah (Cashion 1967, p. 31). However, *P. s*. var. *albifluvis* occupies less than 1 percent of its potential habitat. Occupied habitat was estimated at 200 acres (0.8 sq km) (Franklin 1995; p. 4). This estimate does not include occupied habitat from Colorado occurrences, *P. s*. var. *albifluvis* location data collected in Utah from 2008 through 2010, or herbarium collection locations. Even if these additional locations were to double the amount of habitat occupied by *P. s.* var. *albifluvis*, it is still a small proportion of the amount of land covered by oil shale barrens.

Figure 1. *Penstemon scariosus* var. *albifluvis* element occurrences across Utah and Colorado.



Population Estimates/Status:

We do not know the status of *Penstemon scariosus* var. *albifluvis* prior to 1982. As of 1995, the population estimate was approximately 22,800 plants in the State of Utah, comprised of 16,630 plants occurring on land managed by the BLM Vernal District, 5,639 plants on private land, and 511 plants on state-administered lands (Franklin 1995, p. 2). Additional spot surveys from 2008 to 2010 counted more than 6,000 new plants; however, these surveys were not complete for *P. s.* var. *albifluvis* or this area (Fitts and Fitts 2009, entire; Fitts 2010, p. 5; Dodge and Yates 2010, p. 15). This new information raises the total population estimate to

approximately 29,000 plants in Utah. Colorado occurrences contain approximately 1,550 plants (Colorado Natural Heritage Program 2010b, p. 1).

Penstemon scariosus var. *albifluvis* is documented in 20 occurrences in Utah and 1 occurrence in Colorado (Figure 1). Since 1995, additional locations have been added to the known range of *P. s.* var. *albifluvis* through field work (occurrence 23 and occurrence 1 in Colorado) and data from herbarium collections (occurrences 16–21). We need to further analyze location data for this species because there are several adjacent occurrences that could potentially be combined.

More recent status survey reports demonstrate stable to slightly declining populations in undisturbed habitat from 2004 to 2008 (Sibul and Yates 2006, p. 6; Dodge and Yates 2010, pp. 11–12). In 2009, a significant recruitment event occurred in two long-term monitoring populations (Dodge and Yates 2010, pp. 11–12). Many of these seedlings died between 2009 and 2010, but the net result was an increase in individual plants from 2008 to 2010.

Threats

A. The present or threatened destruction, modification, or curtailment of its habitat or range:

The following factors may affect the habitat or range of *Penstemon scariosus* var. *albifluvis*: (1) energy exploration and development, (2) grazing, (3) off-road recreation, and (4) road maintenance and construction.

(1) Energy exploration and development

Penstemon scariosus var. *albifluvis* may be particularly vulnerable to the effects of energy development on two fronts: (1) from ongoing activities associated with traditional hydrocarbon resources (oil and gas), and (2) the potential of future oil shale and tar sands development, which overlaps much of the traditional oil and gas development areas. Both categories of energy development increase vehicle traffic and removal of soil and vegetation when wells, roads, and associated infrastructure are built (BLM 2008a, pp. 448–449). These disturbances can affect rare plant species through habitat destruction, habitat fragmentation, soil disturbance, spread of invasive weeds, pollinator disturbance, and production of fugitive dust (particulate matter suspended in the air by wind and human activities) (BLM 2008a, pp. 448–449). Habitat loss or fragmentation can result in higher extinction probabilities due to environmental, demographic, or genetic random events and effects associated with smaller sizes of remnant habitat, and greater isolation from neighboring populations (Jules 1998, p. 1,651; Soons 2003, p. 115). Low population numbers and fragmentation pose a threat to rare plant species' genetic potential to adapt to changing environmental conditions (Matthies *et al.* 2004, pp. 484–486). Smaller and more isolated populations produce fewer seeds and pollen, and then populations attract fewer and lower diversity of seed and pollen dispersers (Paschke *et al*. 2002, 1,258; Lienert 2003, p. 62). *P. s*. var. *albifluvis* does not appear to suffer from pollinator limitation (Lewinsohn and Tepedino 2007, entire), indicating that habitat loss and fragmentation from current levels of energy development are not negatively affecting pollinators for this species.

Historically, impacts to *Penstemon scariosus* var. *albifluvis* from traditional oil and gas development were largely avoided because development within the species' habitat was minimal. Concerns surrounding overlapping mineral uses (e.g., natural gas versus oil shale) impeded large-scale energy development. These impediments to oil and gas leasing were removed by the 2005 Federal Energy Policy Act (hereafter "Energy Act"). Until 2005, only 2 of 15 known occurrences had oil and gas wells located within them (USFWS 2005, p. 17). However, the Energy Act effectively opened the entire range of the species to leasing for oil and gas development by allowing separate leasing of traditional oil and gas from tar sands and oil shale. Previously, leasing for oil and gas was delayed in special tar sands and oil shale areas (see 71 FR 3058, January 19, 2006, for a complete discussion).

The impacts of traditional oil and gas development on *Penstemon scariosus* var. *albifluvis* are expected to be high (BLM 2008a, p. 457), although a high level of development within *P. s*. var. *albifluvis* habitat is not yet realized and, based on development to date, we expect it to proceed at a moderate level. The entire range of *P. s*. var. *albifluvis* is underlain with deposits of traditional hydrocarbon resources, primarily natural gas (BLM 2011a, p. 1). In the past two decades, oil and gas production in Uintah County, Utah (where nearly all locations of *P. s*. var. *albifluvis* occur), has increased appreciably. For example, oil production in Uintah County increased over 150 percent from 1999 to 2009, and gas production increased over 1,000 percent from 1988 to 2009 (Utah Division of Oil, Gas, and Mining (UDOGM) 2011, p. 5). The number of new wells drilled in Uintah County increased to a high of 818 in 2008 and decreased to 380 and 442 in 2009 and 2010, which is still well above historical levels (UDOGM 2011, pp. 1–4).

Within *Penstemon scariosus* var. *albifluvis* habitat, well drilling has occurred at a comparatively slow pace thus far: as of March 2011, 65 wells were drilled or approved within the element occurrence boundaries shown in Figure 1 (UDOGM 2011, p. 6). Forty-two of these wells are within occurrence 15 as mapped in Figure 1, a location based on herbarium collection information that has not been recently revisited to confirm *P. s*. var. *albifluvis* presence. Approximately 23 wells were drilled or approved within the remaining occurrences. We do not know actual surface disturbance associated with each well, so we estimate 5 acres of surface disturbance per well pad, including disturbance from associated roads and pipelines. Accordingly, we estimate that about 325 acres are disturbed due to energy development within *P. s.* var. *albifluvis* occurrences, or about 0.7 percent of the area within the occurrences as mapped in Figure 1.

Given the relative increase of oil and gas development throughout Uintah County and the amount of *Penstemon scariosus* var. *albifluvis* habitat currently leased, we can reasonably expect an increase in energy development within *P. s.* var. *albifluvis* habitat over time. Although we do not currently have an accurate geographic representation of all suitable and occupied habitat for *P. s.* var. *albifluvis*, the mapped occurrences in Figure 1 are a rough representation of where suitable and occupied habitat can be found. Thus, we cannot estimate how much of this species' habitat is leased, but we can estimate how much of the area within the occurrences is leased. Approximately 39 percent of the land area within mapped element occurrences on tribal, state, and Federal land (Figure 1) is leased for oil and gas development (BLM 2011a, p. 2). At the time of this analysis, we do not have information about how much private land is currently leased, so we do not know how much more leased area this would add to the total.

Although the above calculation is our best representation of how much suitable habitat for this species might be impacted by oil and gas leases, the actual distribution of locations (sites) of *Penstemon scariosus* var. *albifluvis* across current oil and gas leases is somewhat less. About 15 percent of known *P. s.* var. *albifluvis* locations fall within existing oil and gas leases on Federal and state land. Another 25 percent of known locations are on private land, most of this immediately adjacent to Federal and state leases that could also be developed, but we do not currently know how much of this private land is leased (BLM 2011a, p. 2).

Besides traditional energy development, all Utah *Penstemon scariosus* var. *albifluvis* occurrences are located in high value oil shale or special tar sand areas (BLM 2011a, p. 3). Only the Colorado occurrence of this species is not in an oil shale or special tar sand area. Oil shale development has the greatest potential to impact this species—the most economically feasible oil shale development area overlaps almost 100 percent of known locations of *P. s.* var. *albifluvis* (BLM 2008b, pp. 3, 14; BLM 2011a, p. 3). Additionally, *P. s*. var. *albifluvis* grows directly on surface exposures of the richest oil shale bearing strata in the Parachute Creek member of the Green River formation, making the species highly vulnerable to extirpation if oil shale is developed (Neese and Smith 1982, pp. 22, 60). Areas for potential tar sands development cover the southern portion of *P. s.* var. *albifluvis'* range (BLM 2008b, p. 24), overlapping four element occurrences (BLM 2011a, p. 4).

Both oil shale and tar sands development are more expensive to produce than conventional oil (BLM 2011b, entire). Thus, oil shale development is economically uncertain in today's highly volatile energy market, and we are uncertain whether this method of oil extraction will become economically and environmentally viable

in the foreseeable future (Bartis *et al*. 2005, pp. xiv, 47). Tar sands extraction may be feasible if the cost of crude oil becomes high enough in the future, but these high prices are not projected to occur until at least 2030 (Engemann and Owyang 2010, p. 2), and even then the large amount of water required may be a stumbling block (BLM 2011b, entire). We therefore consider the level of threats to *Penstemon scariosus* var. *albifluvis* populations from potential oil shale and tar sand development to be too speculative to be immediate despite the direct overlap of these resources and *P. s.* var. *albifluvis'* range.

In summary, traditional oil and gas development is ongoing in *Penstemon scariosus* var. *albifluvis'* habitat, and although this development is currently only at low levels, it is likely to increase. Tar sands areas overlap only a small portion of *P. s.* var. *albifluvis'* habitat, and this threat is non-imminent. Oil shale development has the greatest potential to affect this species because it overlaps almost the entire range, but this threat is also non-imminent.

(2) Grazing

Grazing, particularly by domestic livestock, may result in the direct loss of or damage to plants and their habitat through trampling, soil compaction, increased erosion, invasion of noxious weeds, and disturbance to pollinators (Kauffman *et al.* 1983, p. 684; Fleischner 1994, entire; Kearns *et al.* 1998, p. 90; DiTomaso 2000, p. 257). During counts conducted in 1994, winter sheep grazing was observed as the principal use within *Penstemon scariosus* var. *albifluvis* habitat, and sheep "trailing," or walking through habitat was noted in occupied habitat in both 1982 and in 1995 (Franklin 1995, p. 6; UNHP 2011, entire). Currently, all known locations of *P. s.* var. *albifluvis* are within BLM grazing allotments. Most *P. s.* var. *albifluvis* locations (excepting those from herbarium collections) occur within five allotments: four sheep allotments with a season of use from October to May, and one cattle allotment with season of use from April to June and October to February (BLM 2008c, pp. J1–4). Sheep are more likely to graze on forbs than cattle (Cutler 2011, pers. comm.), thus *P. s.* var. *albifluvis* individuals within the sheep allotments are more likely to be grazed than those in the cattle allotment. On the other hand, grazing pressure may currently have less of an impact on *P. s.* var. *albifluvis* than it has in the past —in the past decade, many of the allotments have reduced the number of grazing sheep by half (Cutler 2011, pers. comm.).

More recently, livestock use was observed within a monitored population of *Penstemon scariosus* var. *albifluvis*, although grazing could have been attributed to rodents (Dodge and Yates 2010, p. 9), which presumably would not contribute to trampling. It is likely that this species is afforded some protection from cattle by its propensity to grow on steep slopes, but this would not prevent trampling by sheep, which are not deterred by steep slopes, or by cattle where *P. s.* var. *albifluvis* grows on slope bottoms at low gradients.

Although we have data showing that livestock use occurs within *Penstemon scariosus* var. *albifluvis* habitat, we do not know the intensity or extent of habitat modification it is causing. At this time, we do not consider livestock use a threat to habitat integrity for this species. Direct herbivory, both from livestock and native grazers, may more negatively impact *P. s.* var. *albifluvis* individuals, and this factor is discussed below (see "Factor C: Disease or Predation").

(3) Off-road recreation

Off-highway vehicle (OHV) use may result in direct loss of or damage to plants and their habitat through soil compaction, increased erosion, invasion of noxious weeds, and disturbance to pollinators and their habitat (Eckert *et al.* 1979, entire; Lovich and Bainbridge 1999, p. 316; Ouren *et al*. 2007, entire; BLM 2008c, pp. 4–94; Wilson et al. 2009, p. 1). To date, little off road vehicle (ORV) use has been observed within *Penstemon scariosus* var. *albifluvis* range. Unauthorized off-road use was observed at four occurrences 10 to 20 years ago (UNHP 2011, entire). Federal and industry personnel were increasingly utilizing ORVs in oil and gas field surveys and site location developments prior to 2008 when BLM approved its Vernal Field

Office Resource Management Plan limiting all vehicles to designated routes (BLM 2008c, p. 46). This protective measure will provide indirect conservation benefits within the habitat of *P. s*. var. *albifluvis*. Therefore, we do not consider OHV use a threat to this species.

(4) Road maintenance and construction

Roads that cross through rare plant habitat can, among other negative impacts, destroy habitat and populations, increase road dust, and disturb pollinators (Trombulak and Frissell 2000, entire). We consider this issue separately from roads created for oil and gas development, discussed above (see "(1) Energy exploration and development"), although the effects are the same. Some county roads cross through *Penstemon scariosus* var. *albifluvis* habitat (UNHP 2011, entire), and occasionally new roads or upgrades are proposed, although we cannot quantify the extent or intensity of this factor within *P. s.* var. *albifluvis* habitat.

For example, Uintah County proposed to reconstruct a county road near the former town of Watson within the occupied habitat of *P. s.* var. *albifluvis*. Because the proposed activity was on private lands and did not utilize Federal resources, there was no requirement to limit disturbance to *P.s*. var *albifluvis* or its habitat, or to work with the Service, making it difficult for us to monitor these types of activities. However, this action is likely to directly affect *P. s.* var. *albifluvis* (Roberts 2011, pers. comm.). Overall, road maintenance and construction could destroy habitat and fragment populations, but this potential threat appears to happen intermittently and does not occur across the entire range of the species.

Summary of Factor A

Based on the best available information, livestock grazing, off-road recreation, and road maintenance and construction are limited in scale, and are not threats to *Penstemon scariosus* var. *albifluvis*. However, the potential for multiple layers of energy development within this species' habitat makes *P. s.* var. *albifluvis* especially vulnerable to this factor. Based on our element occurrence map, we estimate that at least 39 percent of *P. s.* var. *albifluvis* habitat is currently open to oil and gas development, and nearly all known populations could potentially be impacted by oil shale and tar sands development. Therefore, energy exploration and development is a threat to *P. s.* var. *albifluvis* now and in the foreseeable future.

B. Overutilization for commercial, recreational, scientific, or educational purposes:

We are not aware of any instances where *Penstemon scariosus* var. *albifluvis* was collected from the wild other than as voucher specimens to document occurrences (UNHP 2011, entire). Therefore, we do not consider overutilization a threat to the species now or in the foreseeable future.

C. Disease or predation:

Grazing by invertebrates, wildlife, and livestock has been documented on *Penstemon scariosus* var. *albifluvis* since data were first collected for this species (Sibul and Yates 2006, p. 9; Dodge and Yates 2010, p. 9; UNHP 2011, entire). Grazers feed on all parts of the plant, including the seeds, damaging or destroying individual plants and effectively reducing their reproductive output [success]. Winter sheep grazing, as previously mentioned, was documented at six occurrences (UNHP 2011, entire), and winter sheep grazing still occurs across the species' range. However, the grazing season for sheep ends by May 1, while *P. s*. var. *albifluvis* flowers in late May, thus sheep would not be able to graze directly on the flowering stalks of *P. s.* var. *albifluvis* that are essential for reproduction. We do not know how severely early-season sheep grazing on non-flowering parts *P. s.* var. *albifluvis* impacts its reproductive effort.

High levels of ungulate, small mammal, and insect herbivory were documented at monitoring sites established in 2004 (Lewinsohn 2005, p. 9). During the drought year of 2004, there were no mature seeds produced at one monitoring site due to a combination of fruiting failure (most likely due to drought) and high levels of herbivory on inflorescences and seed pods (Dodge and Yates 2001, p. 12). Additionally, seed

production at another monitoring site was low and herbivory occurred on 90 percent of the plants (Dodge and Yates 2010, p. 12). We do not know if this herbivory is attributable to livestock or native grazers. Although we do not know to what extent herbivory is impacting this species as a whole over time, it is likely that such high levels of herbivory have a negative impact on at least some sites of this species.

More recently, the level of herbivory within long term monitoring plots continues to fluctuate. In 2009, herbivory was 42 and 91 percent at the two monitoring sites, and in 2010 and 2011 it decreased to 3 and 1 percent at one site, 36 and 85 percent at the other (Dodge and Yates 2010, p. 9; 2011 pp. 10–11). The large decrease in herbivory at one of the sites may have been due to delayed plant development from the cool, wet springs of 2010 and 2011, but we do not know why herbivory decreased and then increased at the second site over the same time (Dodge and Yates 2011, pp. 10–11). Despite high levels of herbivory, germination and establishment still occurs in years following high herbivory rates, but at reduced levels (Dodge and Yates 2010, pp. 11–12). On the other hand, at one monitoring site, about the same number of new seedlings were tagged in 2010 and 2011, despite high levels of herbivory in 2009 (42 percent) and less herbivory in 2010 (3 percent; Dodge and Yates 2011, pp. 10–11). We caution that these data cannot conclusively determine whether herbivory is negatively impacting the species at these study plots because the study is not designed specifically to address this question. Rather, these observational data indicate that herbivory on *Penstemon scariosus* var. *albifluvis* can occur at high levels that are likely to have negative impacts, and further research is needed to specifically address the herbivory impacts. Herbivory on *P. s.* var. *albifluvis* is likely to occur across the species' range based on the fact that livestock trails have been noted throughout the species' range.

Based on the potential negative impacts of herbivory on some locations of *Penstemon scariosus* var. *albifluvis* and the likelihood that similar impacts occur across the range of the species, we consider herbivory a threat to this species. Although we did not consider grazing a threat to *P. s.* var. *albifluvis* habitat (see factor A for a complete discussion), this does not contradict our opinion that herbivory is a threat to this species. Rather, the documented effects of herbivory on *P. s*. var. *albifluvis* to date is limited to a reduction in reproductive output in some years at specific sites rather than widespread impacts on habitat. Thus, we consider herbivory to be a low-level, imminent threat to this species.

D. The inadequacy of existing regulatory mechanisms:

There are no laws protecting plants on private or state lands in Utah. Approximately 29 percent of the species' total population occurs on State of Utah or private lands. Private and State of Utah lands have no regulatory authority affording protection to federally listed or candidate plant species. We know oil and gas activity is occurring within the immediate vicinity of known populations on private and state lands. These populations are not protected or monitored on a regular basis.

About 71 percent of *Penstemon scariosus* var. *albifluvis* individuals are found on BLM land, 25 percent on private land, and 4 percent on state land. Because the majority of the known population occurs on BLM managed land, actions on Federal lands have the most potential to impact this species. *P. s.* var. *albifluvis* is listed as a BLM-sensitive plant so limited policy-level protection by the BLM is afforded through the Special Status Species Management Policy Manual # 6840 which forms the basis for special status species management on BLM lands (BLM 2008d, entire). The BLM currently affords candidate species the same protection as listed species, and for P. s. var. albifluvis conservation measures incorporated by the Vernal BLM include a 300-foot buffer from surface-disturbing activities (Roe 2011, pers. comm.). Even without protection under the Act, *P. s.* var. *albifluvis* would remain a BLM-sensitive plant and would retain a 150-foot protection buffer from surface disturbance (Roe 2011, pers. comm.), although we do not consider this buffer sufficient enough to effectively prevent negative impacts associated with surface disturbing activities. Additionally, the 150-foot buffer for sensitive plant species is not official policy for the Vernal BLM and could potentially change with new management or under specific project scenarios.

The Federal Land Policy and Management Act requires the BLM to develop and revise land-use plans when appropriate (43 United States Code 1712 [a]). The BLM developed a new Resource Management Plan

(RMP) for the Vernal Field Office to consolidate existing land-use plans and to balance use and protection of resources (BLM 2008c, pp. 1–2). Through the RMP, the Vernal Field Office is directed to conserve and recover all special status species, including candidate species (BLM 2008c, p. 129). However, the RMP special status species goals and objectives do not legally ensure that all Federal actions do not impact *Penstemon scariosus* var. *albifluvis*. For example, conservation measures implemented by the Vernal BLM thus far have not fully prevented impacts to listed species or prevented energy development within occupied habitat. Therefore, we have to assume that despite implementing conservation measures, increased energy development in *P. s.* var. *albifluvis* habitat will likely increase direct loss of individual plants and habitat, and decrease the long-term ability to implement more effective conservation measures. The Vernal BLM's RMP requires conservation measures be included for site specific projects when USFWS candidate species and other Special Status Species may be affected by Federal actions (BLM 2008c, p. 129). However, there are no regulatory mandates specific to *P. s*. var. *albifluvis*.

During oil and gas development activities that have occurred to date, the BLM has attempted to minimize impacts to the species and its habitat through incorporation of conservation measures through section 7 consultation under the Act. Conservation measures include moving well pad and pipeline locations to avoid direct impacts to the species. These measures minimize direct impacts to the species, particularly at current low rates of development that have occurred in the habitat. Despite implementing conservation measures, some projects could still proceed within occupied *Penstemon scariosus* var. *albifluvis* habitat that would impact the species. Thus, increased energy development in *P. s*. var. *albifluvis* habitat will increase the likelihood of direct loss of individual plants, habitat loss, and fragmentation (BLM 2008a, pp. 448–449).

In conclusion, in the absence of the Act's protection, the only regulation at any level of jurisdiction to protect *Penstemon scariosus* var. *albifluvis* is through the BLM Special Status Species Management Policy Manual # 6840, which affords insufficient protections. With the potential for increased development in major portions of this species' range, we consider the inadequacy of existing regulatory mechanisms a threat to this species.

E. Other natural or manmade factors affecting its continued existence:

Within the range of the species, we experienced a drought during the first half of the current decade (2000-2004). Years of reduced precipitation may adversely impact the population. Drought may affect the species' life cycle; for example, *Penstemon scariosus* var. *albifluvis* plants observed in 2001 surveys were absent in 2002 (Torti 2003, p. 8). Although the species was negatively affected by this latest drought, *P. s.* var. *albifluvis* is adapted to drought conditions. The species is long lived on xeric sites with shallow soils. In addition, the nature of the species' seed bank is unknown. It appears that reproduction is an episodic event dependent on infrequent mesic (relatively wetter) growing seasons. In other similarly drought-adapted rare plants in the Southwest, a drought from 2001 to 2004 led to a noticeable decline in survival, vigor, and reproductive output (Anderton 2002, p. 1; Van Buren and Harper 2002, p. 3; Van Buren and Harper 2004, entire; Roth 2008a, entire; Roth 2008b, pp. 3–4). Ultimately, drought itself may not be a threat to *P. s.* var. *albifluvis*, but may increase extinction risk when combined with other threats such as energy-related disturbance or herbivory.

Our analyses under the Endangered Species Act include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other

relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Climate change is likely to affect the long-term survival and distribution of native species, such as *Penstemon scariosus* var. *albifluvis*, through changes in temperature and precipitation. Hot extremes, heat waves, and heavy precipitation will increase in frequency, with the Southwest experiencing the greatest temperature increase in the continental United States (Karl *et al*. 2009, pp. 28, 129). Approximately 20 to 30 percent of plant and animal species are at increased risk of extinction if increases in global average temperature exceed 2.7 to 4.5 degrees Fahrenheit (°F) (1.5 to 2.5 degrees Celsius (°C)) (Intergovernmental Panel on Climate Change (IPCC) 2007, p. 48). In the southwestern United States, average temperatures increased approximately 1.5 °F (0.8 °C) compared to a 1960 to 1979 baseline (Karl *et al*. 2009, p. 129). By the end of this century, temperatures are expected to warm a total of 4 to 10 °F (2 to 5 °C) in the Southwest (Karl *et al.* 2009, p. 129).

Annual mean precipitation levels are expected to decrease in western North America and especially the southwestern States by mid-century (IPCC 2007, p. 8; Seager *et al.* 2007, p. 1181). Throughout *Penstemon scariosus* var. *albifluvis'* range, precipitation is predicted to increase 10 to 15 percent in the winter, decrease 5 to 15 percent in spring and summer, and remain unchanged in the fall under the highest emissions scenario (Karl *et al*. 2009, p. 29). The levels of aridity of recent drought conditions and perhaps those of the 1950s drought years will become the new climatology for the southwestern United States (Seager *et al*. 2007, p. 1181). Much of the Southwest remains in a 10-year drought, "the most severe western drought of the last 110 years" (Karl *et al*. 2009, p. 130). Although droughts occur more frequently in areas with minimal precipitation, even a slight reduction from normal precipitation may lead to severe reductions in plant production. Therefore, the smallest change in environmental factors, especially precipitation, plays a decisive role in plant survival in arid regions (Herbel *et al*. 1972, p. 1084).

In summary, climate change is affecting and will affect temperature and precipitation events in the future. While naturally occurring droughts are not likely to impact the long-term persistence of *Penstemon scariosus* var. *albifluvis*, an increase in periodic prolonged droughts due to climate change could impact the species across its entire range in the future. Although we do have some trend data available for this species, those data are not linked to environmental factors, and for now it is too speculative to determine the likelihood that climate change will threaten *P. s*. var. *albifluvis*. Therefore, based on the best scientific and commercial information available, we conclude that drought and climate change are not threats to this species now or for the foreseeable future.

Conservation Measures Planned or Implemented :

Prior to 1994, the BLM funded data collection pertaining to distribution and abundance of *Penstemon scariosus* var. *albifluvis* (Franklin 1995, entire). The species' current status as a candidate species and a BLM special status species has provided some protection on BLM lands from the limited amount of oil and gas activities that occurred prior to 2003. Conservation measures implemented by the BLM for oil and gas activities near *P. s*. var. *albifluvis* mostly, but not always, prevent loss of individuals and habitat. Conservation measures include conducting pre-project surveys, moving proposed well pad and pipeline locations, and monitoring plants during and after construction.

Summary of Threats :

Penstemon scariosus var. *albifluvis* is vulnerable to habitat destruction as a consequence of oil and gas drilling within its limited habitat. This threat factor is currently ongoing and expected to increase to moderate levels in the near term. Historically, oil and gas development in the species' habitat was impeded because of concerns surrounding overlapping mineral uses (e.g., natural gas versus oil shale). These impediments to oil and gas leasing were removed by the 2005 Federal Energy Policy Act. The future threat of oil shale

development remains a reality, making this factor a non-imminent but potentially serious threat. Finally, *P. s.* var. *albifluvis* is a prominent feature of its sparsely vegetated habitat where it is heavily grazed by insects, small mammals, and (where topographically available) by domestic livestock, primarily sheep. Thus, the threat of grazing is low in magnitude and imminent.

For species that are being removed from candidate status:

_____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

Recommended Conservation Measures :

Continued and expanded population monitoring is essential for the conservation of *Penstemon scariosus* var. *albifluvis*. Additional surveys for unknown populations should be conducted. New surveys should include GPS locations of all populations and accurate, computer-based GIS mapping and analysis. Most importantly, BLM should continue its protection from direct impacts from energy and other development within the species' habitat.

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	8
		Subspecies/Population	**9**
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

Rationale for Change in Listing Priority Number:

Magnitude:

We maintain the current listing priority number 9 as indicated in last year's Candidate Notice of Review. Federal government policies, technological advances, and economics are now in place to advance oil and gas development, and potentially oil shale and tar sands development, in areas occupied by *Penstemon scariosus* var. *albifluvis*. The level of threats to populations of the species is high due to the direct overlap of energy resources and known plant occurrences. However, the uncertainty of oil shale development progressing to commercial development and BLM's Special Status Species policy and commitments to protect these species in the current RMP lessen the threat to this species, although these efforts do not completely remove the threat of energy development. Fifteen percent of mapped occurrences are within developed and expanding

conventional oil and gas fields on BLM lands, and 17 wells have been drilled within these occurrences. In addition, all known occurrences and suitable habitat for *P. s.* var. *albifluvis* lie directly on surface exposures of the richest oil shale bearing strata in the Parachute Creek member of the Green River formation. With such limited occupied habitat, development of oil shale resources is likely to negatively impact the species. Although the BLM is directed to conserve and recover all special status species, including candidate species, their RMP special status species goals and objectives do not legally ensure that Federal actions are not likely to jeopardize *P. s.* var. *albifluvis*.

BLM has authorized six research and development projects to allow companies to refine the extraction and processing techniques of oil shale and tar sands (BLM 2008b, p. 15). The Vernal BLM currently leases one area for oil shale research and development (BLM 2008e, p. 25). We are not aware of any commercial oil shale projects proposed on Federal lands. None of these projects are within the range of the species (BLM 2008b, p. 2-12). We anticipate that in the future, with a better understanding of environmental impacts and technological capabilities that the research and development projects will demonstrate, this threat may become viable. At this time, we are uncertain as to when, if at all, commercial oil shale and tar sands developments will occur.

With such limited occupied habitat, any destruction, modification, or curtailment of the habitat will have a negative impact the species. BLM's Special Status Species policy and commitments to protect the species in the current RMP (BLM 2008b, p. 127) will lessen direct impacts to the species. In addition, the impacts will affect individuals but will not affect the species at a level that we would expect extinction to occur. Therefore, we maintain that a moderate threat exists toward *Penstemon scariosus* var. *albifluvis* from present and potential impacts of oil and gas field development on the species and its habitat.

Imminence :

Oil and gas development is ongoing in *Penstemon scariosus* var. *albifluvis'* habitat, and we expect the level of development to increase. Thus, we consider traditional oil and gas development an imminent threat to this species. Oil shale development remains uncertain within the species' habitat, and is not expected to be a significant factor in the foreseeable future. We also consider the threat of predation by wildlife and livestock as imminent.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

Emergency Listing Review

__No__ Is Emergency Listing Warranted?

Potential impacts to the species are not likely to destroy occupied habitat throughout all or a significant portion of the species' range within the immediate future. If oil and gas development increases substantially throughout a significant portion of the species' range, emergency listing would be reconsidered.

Description of Monitoring:

A Challenge Cost Share Agreement between Red Butte Garden and the Vernal BLM was established in 2003 for conducting demographic research on *Penstemon scariosus* var. *albifluvis*. In Utah, research and monitoring is ongoing in two locations that were established in 2004, one on private land and one on BLM lands (Dodge and Yates 2010, entire). In 2010, an additional monitoring population was added to the study in Utah (Dodge and Yates 2010, p. 8). Two occurrences in Colorado number 1,550 individuals and are monitored every three years by the BLM (Colorado Natural Heritage Program 2010b, p. 1-3). During the initial two years of monitoring in Utah, no individuals were recruited into the two monitored populations. In 2009 significant germination occurred at both monitored populations (Dodge and Yates 2010, p. 11–12).

Flowering and seed set, however, increased from 2004 to 2005, remained high until 2009, and then decreased in 2010 (Dodge and Yates 2010, p. 11–12). Beginning in 2008, The Utah Natural Heritage Program initiated a range-wide survey of the species and will note the extent of localized threats to the species.

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Colorado,Utah

Indicate which State(s) did not provide any information or comment:

none

State Coordination:

The Colorado Natural Heritage Program based at Colorado State University, and the Utah Natural Heritage Program based at the Utah Division of Wildlife Resources, maintain active databases on the distribution and abundance of *Penstemon scariosus* var. *albifluvis*. Information from these sources was incorporated into this report.

Literature Cited:

Anderton, L. 2002. Summary of Spence's *Schoenocrambe barnebyi* Monitoring Plot, 1998–2001. Unpublished report prepared for the Capitol Reef National Park. 1 pp.

Bureau of Land Management (BLM). 2007. Draft Oil Shale and Tar Sands Resource Management Plan Amendments to Address Land Use Allocations in Colorado, Utah, and Wyoming and Programmatic Environmental impact Statement. Washington, D.C.

Bureau of Land Management (BLM). 2008a. Proposed RMP and Final EIS, Chapter 4: Environmental Consequences. 628 pp.

Bureau of Land Management (BLM). 2008b. Approved Resource Management Plan Amendments/Record of Decision (ROD) for Oil Shale and Tar Sands Resources to Address Land Use Allocations in Colorado, Utah, and Wyoming and Final Programmatic Environmental Impact Statement. 8,971 pp.

Bureau of Land Management (BLM). 2008c. Record of decision and approved resource management plan. Vernal Field Office. 201 pp. plus appendices.

Bureau of Land Management (BLM). 2008d. BLM Manual, MS-6840. Accessed online at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/blm_manual.html on July 26, 2010. OR Bureau of Land Management. 2008. ESA and BLM Guidance and Policy Manual 6840: Special Status Species Management. Revised manual. 48 pp.

Bureau of Land Management (BLM). 2008e. Proposed RMP and Final EIS, Chapter 3: Affected Environment. 140 pp.

Bureau of Land Management (BLM). 2011a. Oil and gas Geographic Information System data accessed via BLM servers March 2011. 4 pp.

Bureau of Land Management (BLM). 2011b. About Oil Shale. Oil Shale and Tar Sands Programmatic EIS Information Center website. http://www.ostseis.anl.gov/guide/oilshale/index.cfm

Colorado Natural Heritage Program. 2010a. *Penstemon scariosus* var. *albifluvis* Element Occurrence Report. Electronic database, Colorado State University, Ft. Collins.

Colorado Natural Heritage Program. 2010b. *Penstemon scariosus* var. *albifluvis* Element State Rank Report. Colorado State University, Ft. Collins. 3 pp.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1984. Intermountain Flora, Vascular Plants of the Intermountain West, U.S.A., Volume Four Subclass Asteridae (except Asteraceae). The New York Botanical Garden, Bronx, New York. 573 pp.

Cutler, M. 2011. Personal communication. Rangeland Management Specialist, Vernal Field Office, Bureau of Land Management, Vernal, Utah.

Dodge, R., and W. Yates. 2010. 2010 Status Report—Demographic Monitoring and Survey for *Penstemon scarious* var. *albifluvis* and *Penstemon grahamii* in Uintah County, Utah. Red Butte Garden and Arboretum, University of Utah, Salt Lake City, Utah. 15 pp.

Dodge, R., and W. Yates. 2011. 2011 Status Report—Demographic Monitoring and Survey for *Penstemon scarious* var. *albifluvis* and *Penstemon grahamii* in Uintah County, Utah. Red Butte Garden and Arboretum, University of Utah, Salt Lake City, Utah. 42 pp.

Eckert, R.E. Jr., M.K. Wood, W.H. Blackburn, F.F. Peterson. 1979. Impacts of Off-road vehicles on infiltration and sediment production of two desert soils. Journal of Range Management 32: 394–397.

England, J.L. 1982. A New Species of *Penstemon* (Scrophulariaceae) from the Uinta Basin of Utah and Colorado. Great Basin Naturalist 42:367-368.

Fitts, R., and S. Fitts. 2008. Field Inventory of *Penstemon grahamii* and associated endemic species in Uintah County, Utah. Utah Natural Heritage Program, Salt Lake City, Utah. 6 pp.

Fitts, R. and S. Fitts. 2009. Field Inventory of *Penstemon grahamii* and associated endemic species in Uintah County, Utah. Utah Natural Heritage Program, Salt Lake City, Utah. 36 pp.

Fitts, R. 2010. Field Survey for *Penstemon grahamii* (Graham's Beardtongue), Uintah County, Utah. Utah Natural Heritage Program, Salt Lake City, Utah. 22 pp.

Franklin, M. A. 1995. Field Inventory of *Penstemon scariosus* var. *albifluvis* (R.L. England) N. Holmgren, in the Book Cliffs Resource Area, Uinta Basin, Utah – Final Report for 1994 Challenge Cost Share Project. 9 pp + appendices.

Franklin, M.A. 2005. Plant information compiled by the Utah Natural Heritage Program: a progress report. Publication number 05-40. Utah Division of Wildlife Resources, Salt Lake City, Utah. 334 pp.
Herbel, C. H., F. N. Ares, R.A. Wright. 1972. Drought effects on a semidesert grassland range. Ecology, Vol. 53(6):1084–1093.

IPCC. 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K., and A. Reisinger (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Jules, E.S. 1998. Habitat fragmentation and demographic change for a common plant: *Trillium* in old-growth forest. Ecology 79, 1645-1656.

Karl, T.R., J.M. Melillo, and T.C. Peterson, (eds.). 2009. Global Climate Change Impacts in the United

States. Cambridge University Press.

Lewinsohn, J., V. Tepedino, and T. Toler. 2005. 2005 Status Report on Demography and Pollinators for *Penstemon scariosus* var. *albifluvis* and *Penstemon grahamii* in Uintah County, Utah. Report prepared for Bureau of Land Management, Utah State Office, Salt Lake City, Utah. 20 pp.

Lewinsohn, J. and V. Tepedino. 2007. Breeding biology and flower visitors of the rare White River penstemon, *Penstemon scariosus* var. *albifluvis* (Scrophulariaceae). Western North American Naturalist 67:232–237.

Lienert, J. 2003. Habitat fragmentation effects on fitness of plant populations -- a review. Journal Nature Conservation 12:53–72.

Lovich, J.E. and D. Bainbridge. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration. Environmental Management, Vol. 24:309–326.

Matthies, D., I. Brauer, W. Maibom and T. Tscharntke. 2004. Population size and the risk of local extinction: empirical evidence from rare plants. Oikos 105:481–488.

Neese, E., and F. Smith. 1982. Threatened and Endangered Plant Inventory for the Oil Shale RMP, Bookcliffs Resource Area, Utah. Unpublished status report on file with the Bureau of Land Management, Vernal, Utah. 89 pp. + appendices.

Roberts, M. 2011. Personal communication. Land Law Examiner, Vernal Field Office, Bureau of Land Management, Vernal, Utah.

Seager, R., T. Mingfang, I. Held, Y. Kushnir, J. Lu, G. Vecchi, H. Huang, N. Harnik, A. Leetmaa, N. Lau, C. Li, J. Velez, and N. Naik. 2007. Model projections of an imminent transition to a more arid climate in southwestern North America. Science 316: 1181–1184.

Sibul, A., and W. Yates. 2006. 2006 Status Report on Demography and Pollinators for *Penstemon scariosus* var. *albifluvis* and *Penstemon grahamii* in Uintah County, Utah. Report prepared for Bureau of Land Management, Utah State Office, Salt Lake City, Utah. 20 pp.

Soons, M.B. 2003. Habitat fragmentation and connectivity: spatial and temporal characteristics of the colonization process in plants. Thesis. Utrecht University, Netherlands. 129 pp.

Torti, S. for Bolander R. 2003. Conservation & Research Plans for Four Plant Species in Northeastern Utah. Northern Species in Vernal BLM District: *Penstemon scariosus* var. *albifluvis Penstemon goodrichii*, *Astragalus equisolensis Penstemon grahamii*.

Trombulak, S. C. and C. A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14:18–30.

Ouren, D.S., C. Haas, C.P. Melcher, S.C. Stewart, P.D. Ponds, N.R. Sexton, L. Burris, T. Fancher, and Z.H. Bowen. 2007. Environmental Effects of Off-Highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated Bibliographies, Extensive Bibliographies, and Internet Resources. U.S. Department of the Interior, U.S. Geological Survey Open-File Report 2007–1353. 225 pp.

Paschke, M., A. Clemens, and B. Schmidt. 2002. Effects of population size and pollen diversity on reproductive success and offspring size in the narrow endemic *Cochlearia bavarica* (Brassicaceae). American Journal of Botany 89:1250–1259.

Roe, A. 2011. Personal communication. Minerals Botanist, Vernal Field Office, Bureau of Land Management, Vernal, Utah.

Roth, D. 2008a. Monitoring Report, Pediocactus bradyi, Marble Canyon, Coconino Co., AZ. Unpublished report prepared for the Navajo Natural Heritage Program, Window Rock, AZ. 9 pp.

Roth, D. 2008b. Monitoring Report, - *Sclerocactus mesae verdae* Transplant Project Northern Navajo Fairgrounds, Shiprock, San Juan County, NM. Unpublished report prepared for the Navajo Natural Heritage Program, Window Rock, AZ. 8 pp.

Utah Division of Oil, Gas, and Mining. 2011. Oil and gas Geographic Information System data accessed via BLM servers March 2011. http://gis.utah.gov/sgid-vector-download/utah-sgid-vector-gis-data-layers-by-category#Energy. 6 pp.

Utah Natural Heritage Program. 2011. *Penstemon scariosus* var. *albifluvis* Element Occurrence Report. Electronic database. Utah Division of Wildlife Resources, Salt Lake City, Utah.

Van Buren, R. and K.T. Harper. 2002. 2001 Status Report *Lesquerella tumulosa*. Kodachrome Bladderpod Demography. Order No. JC-POO-3015A. 9 pp + appendices.

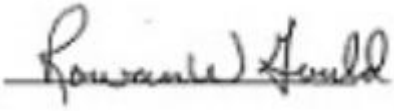
Van Buren, R. and K. T. Harper. 2004. Two-Year annual monitoring report – 2003 & 2004. Holmgren milk-vetch (*Astragalus holmgreniorum*). Unpublished report prepared for the Bureau of Land Management, St. George Field Office, UT. Agreement Number JCA031006. 30pp.

Wilson, J.S., O.J. Messinger, and T. Griswold. 2009. Variation between bee communities on a sand dune complex in the Great Basin Desert, North America: implications for sand dune conservation. Journal of Arid Environments 73: 666–671.

Approval/Concurrence:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  05/31/2012
Date

Concur:  11/06/2012
Date

Did not concur: _____ _____
Date

Director's Remarks: